

Monitoring CO₂ flux, gas geochemistry and heat output from El Chichon volcano, Mexico.

MARIANA PATRICIA JACOME PAZ⁴, SALVATORE INGUAGGIATO², AGNES MAZOT³, YURI TARAN¹

¹INSTITUTO DE GEOFISICA. UNAM, MEXICO, ²PALERMO. ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA DI ITALIA. (INGV), ITALIA, ³GNS SCIENCE, NEW ZELAND, ⁴POSGRADO EN CIENCIAS DE LA TIERRA.UNAM, MEXICO

E-mail: mapajapaz@hotmail.com

El Chichon volcano, the youngest of the Chiapas volcanic arc, is located in the northwestern portion of the state of Chiapas, Mexico, between the Trans-Mexican Volcanic Belt and the Central American volcanic arc. The volcano crater, which is 1 km in diameter and 160 m deep, contains a warm (30-32°C) crater lake, boiling springs and steam-heated pools, and fumaroles with temperatures close to 100°C which are the surface manifestation of an active volcano-hydrothermal system (Taran et al., 1998).

After the last strong and destructive eruption occurred in 1982 the geochemical monitoring of El Chichon volcano has been developed (e.g., Peiffer et al., 2011 and references therein). The first CO₂ flux measurements at the lake surface was performed in 2007 using the floating accumulation chamber (Mazot and Taran, 2009).

The first data yielded values of 1190 g m⁻² d⁻¹ (March 2007), 730 g m⁻² d⁻¹ (December 2007) and 1134 g m⁻² d⁻¹ (April 2008) with the total output of 164 ± 9.5 t/d (March 2007), 59 ± 2.5 t/d (December 2007) and 109 ± 6.6 t/d (April 2008). The estimated average flux from the crater floor using data only from the lake surface was estimated as 1.102 g m⁻²d⁻¹ in April 2008 with the total emission of 144 ± 5.9 t/d (Mazot et al. 2011). The main permeable structure discovered in these works identified as the Cathedral fault crosses the lake in NW-SE direction and is characterized by a high CO₂ emission. In this work we report new data on the total output of CO₂ from the crater area (lake plus soil) and present a generalized map of the crater floor with the structure, CO₂ flux, soil temperature and carbon isotopic composition. Furthermore, the total convective heat output will be estimated using CO₂/H₂O ratios obtained from gas chemistry of the fumaroles. The study of these geochemical data will provide insights into El Chichon volcano-hydrothermal system.